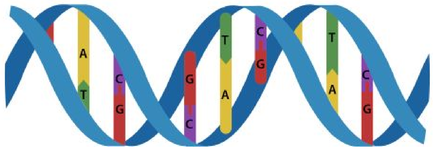
Let's talk about DNA!



DNA is the instructions to make every living thing, including us!

It's like a recipe book, which has the instructions to make a full meal.

DNA determines the way we look: eye color, height, hair color… We get it from our parents. That's why we look like them!

All humans in the world share 99.9% of their DNA. That means only 0.01% of DNA is responsible for our differences. That's crazy!

We also share 60% of our DNA with bananas and chickens!

Our DNA "recipe books" are split into individual recipes called *genes*.

Each gene makes one *protein*, the way each recipe makes one course. Proteins are what we actually see when we talk about eye color.

In synthetic biology, we *rearrange recipes* to make new recipe books for new meals. We combine genes in new ways to solve problems.

By putting jellyfish DNA in bacteria, we can make bacteria that glow in the dark, just like jellyfish!

See your own DNA!

Step 1: Lick your cheeks and spit into a cup

Step 2: Add dish soap

Step 3: Add salt and mix well

Step 4: Add isopropyl alcohol and mix well

Step 5: Pick up your DNA with a wooden stick!

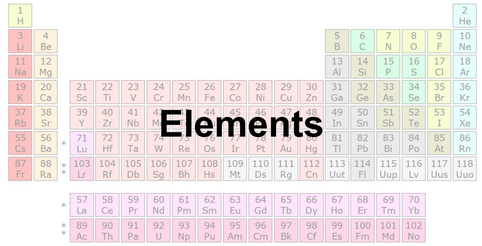
iGEM UNIVERSITY OF PITTSBURGH 2016

Pittsburgh 2016

HOT METAL SWITCH

a metal detection system

Lead and thallium



plates, batteries, water pipes, pesticides, food preservatives, makeup, and paint

rat poison, ant poison, mining byproduct, electronics manufacturing

throwing up, bad memory, painful muscles, hearing loss, slower learning

hair loss, nerve damage, death

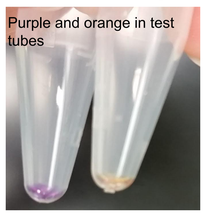
from not throwing out metals properly

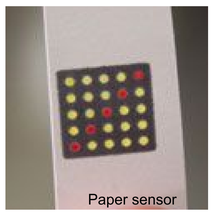
gets into drinking water

no way to test for thallium at home

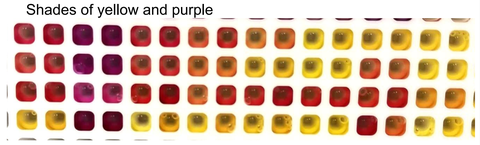
lead tests cost $30 and don't give specific amounts

Our project: a lead and thallium sensor



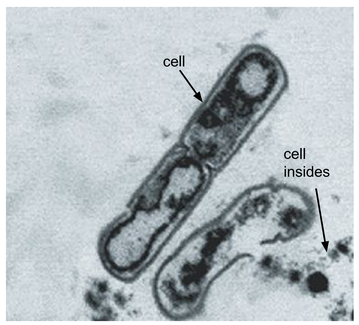


paper
use at home
$0.30 per test
purple means there's metal

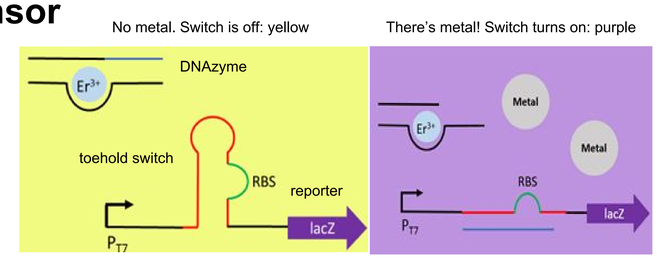


Cell-free extract

liquid insides of a cell
makes protein from DNA
easy to work with



Sensor

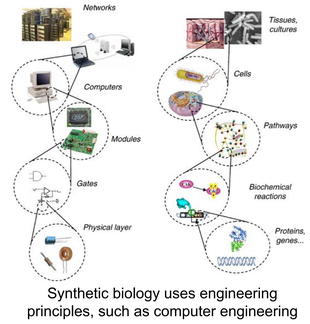


DNAzyme: cuts the top piece of DNA when there's lead or thallium.
toehold switch: switch turned on by the blue piece of DNA cut by the DNAzyme.
reporter: tells us the toehold switch is on. It's a protein called LacZ, which turns the liquid from yellow to purple.

What is *synthetic biology*?

It's a new type of science about *building new things* from parts we find in living things.

Every living thing is made from many parts, the way this helicopter is made from many Lego bricks.



Synthetic biology uses engineering principles, such as computer engineering

Synthetic biology parts are *genes*!

Synthetic biology: Combine genes in new ways to build new machines that solve problems.

What is *iGEM*?

iGEM is a contest all about *synthetic biology*!

Teams from all over the world solve problems including...

global warming

chewing gum stuck to the sidewalk

and more!

"Giant Jamboree" competition in Boston, where we share our work and win prizes!

Thank you to our sponsors!

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